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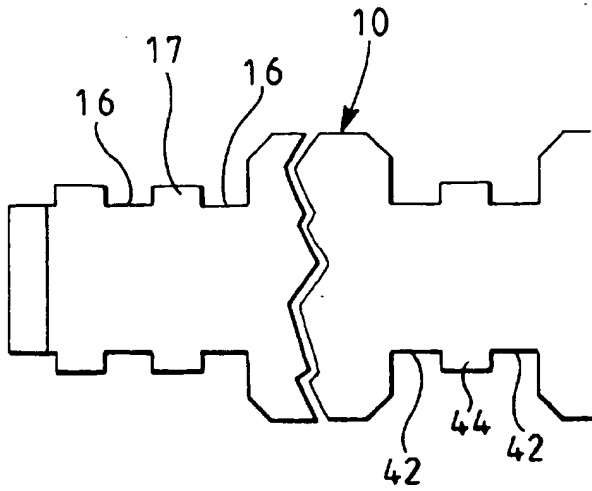


FIG 5

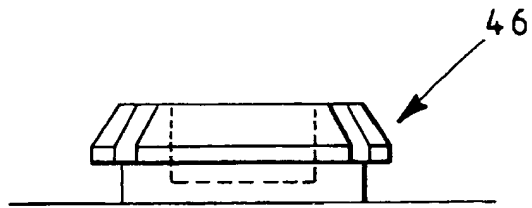


FIG 6

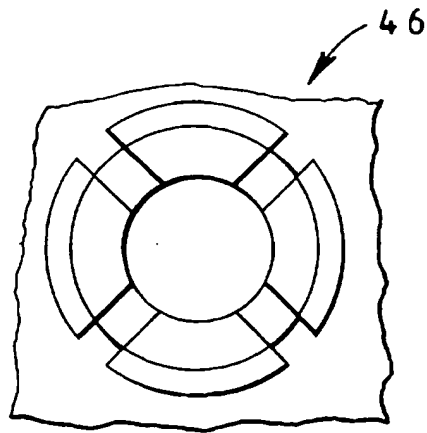


FIG 7

"Improvements in or relating to pallets"

The invention relates to pallets for the support and transfer of goods.

As is well known, a pallet is a shallow rectangular structure on which goods can be stacked and which provides horizontal slots into which the forks of a fork lift truck may
5 be inserted so that the pallet, together with the goods stacked on it, can be lifted and transported. In some cases the goods may remain stacked on the pallet during storage, as a means, for example, of keeping the goods out of contact with the ground.

The most common forms of pallet are made from wood and comprise a number of spaced elongate parallel wooden bearers across which are nailed spaced parallel
10 planks disposed at right angles to the bearers, these planks being known as stretchers. The stretchers may be nailed only across the upper sides of the bearers but may also be nailed across the underside. In use, the forks of the fork lift truck are inserted between the bearers and below the upper stretchers so that the pallet can be lifted. It is also known to form pallets of this general kind from plastics material, the pallet then
15 comprising plastics bearers and stretchers which are welded together in the appropriate configuration. Alternatively some or all of the parts of the plastics pallet may be integrally moulded together.

Although wooden pallets are cheap and readily available, they suffer from certain disadvantages. They are, for example, prone to weakening and distortion, particularly
20 after prolonged use, as a result of the nails loosening so that the pallet "parallelograms", i.e. distorts from its original rectangular shape to a diamond shape. The wooden pallets are also readily damaged in other ways, through mishandling, with the result that they

only have a limited life.

Also, although efforts are made to ensure that pallets used for transport are returned for re-use, there is in practice considerable wastage of the pallets and only a percentage of them are generally re-used. One reason for this is that used pallets are often regarded as a convenient source of timber for other purposes and many are appropriated and broken up to be put to other use.

These disadvantages may be overcome by plastics pallets where the stretchers and bearers are securely welded together, but existing plastics pallets suffer from other disadvantages. For example, due to the cost of the plastics material, the stretchers tend to be fairly widely spaced apart with the result that they may not be suitable for the stacking of sheet or other material where, under the considerable weight of the stack, the lower sheets are likely to bow downwardly between the stretchers. With existing plastics pallet designs, also, it may be difficult or impossible to make pallets of different dimensions using the same basic components.

The present invention sets out to provide a new and improved design of pallet which may overcome some or all of the above-mentioned problems and which also provides other advantages. The invention is particularly applicable to pallets manufactured, at least in part, from plastics material but the invention is not limited to plastics pallets and may also be applicable to pallets formed from other materials.

According to the invention there is provided a pallet comprising a number of spaced elongate parallel bearers across which are secured a number of spaced elongate parallel stretchers disposed generally at right angles to the bearers, with at least one of

the bearers and at least one of the stretchers having inter-engaging formations serving to maintain the bearer and stretcher substantially at right angles to one another.

Preferably the inter-engaging formations are disengageable when required, with releasable securing means being provided to secure the bearer and stretcher together and
5 to hold the formations in engagement with one another.

The securing means may comprise a readily detachable fastening device, such as one or more screws, bolts, locking pins or clamps, or may comprise a rupturable or cuttable fastening device, such as a rivet, or may comprise a snap fastening device that comprises a male stud projection formed on one part which securely detachably engages
10 a female opening formed on an opposing part. Preferably at least two of the fastening devices are provided at spaced locations to secure the stretcher to the bearer.

The inter-engaging formations comprise at least one projection formed on a portion of either the bearer or stretcher which engages within at least one opening formed on a corresponding portion of a corresponding opposing bearer or stretcher. As
15 an example, the formations may comprise inter-engaging ribs and grooves, and preferably the ribs and grooves extend longitudinally with respect to the stretchers and transversely with respect to the bearers, with at least one of the bearers being formed with alternating ribs and grooves to engage respective alternating grooves and ribs formed on at least one of the stretchers. In the case where the formations are ribs and
20 grooves extending longitudinally with respect to the stretcher, the stretcher may be of constant cross-sectional shape.

In any of the above arrangements at least one of the bearers may be provided

with a support surface between two adjacent stretchers lying in substantially the same plane as a support surface on the stretchers. The bearer support surface may be formed on an integral part of the bearer, or may be formed on a separate element secured to the bearer. Preferably the bearer support surface extends the whole length between the adjacent stretchers and the full width of the bearer.

Stretchers may be secured across only upper sides of the bearers to provide a single-sided pallet. However, spaced parallel stretchers may also be secured across undersides of the bearers to provide a double-sided pallet. In the case of a double-sided pallet, the underside stretchers may be secured to and inter-engaged with the bearers in a similar manner to the manner in which the upper side stretchers are secured to and inter-engaged with the bearers.

In order to reduce weight and to conform to design constraints, the width of the bearer may vary, and the bearers and/or stretchers may be at least partly hollow.

The stretchers and bearers may be formed from the same material, with a suitable plastics material being polypropylene, and upper and/or lower surfaces of the bearers and/or stretchers may be at least partly formed with an anti-slip surface.

The bearers, stretchers and anti-slip surface may all be injection moulded from plastics. However, if the stretchers are of constant cross-sectional area, the stretchers and anti-slip surface may be extruded. The anti-slip surface may be co-moulded and/or co-extruded concurrently with the moulding and/or extrusion of the bearers and/or stretchers in order to reduce manufacturing costs and time, or the anti-slip surface may be formed subsequent to the moulding and/or extrusion of the bearers and/or stretchers

by dip-coating.

The following is a more detailed description of embodiments of the invention, by way of example, reference being made to the accompanying drawings in which:

Figure 1 is an exploded perspective view of one form of pallet according to the invention,

Figure 1A is an enlarged portion of Figure 1,

Figure 2 is a plan view of part of one of the bearers of the pallet,

Figure 3 is an end view of the bearer,

Figure 4 is a side elevation of part of a bearer showing how the stretchers inter-engage with the bearer,

Figure 5 is a partial side elevation of an alternative form of bearer,

Figure 6 is a side elevation of a male stud portion of a snap fastener used as a fastening device fastening bearers to stretchers, and

Figure 7 is a plan view of the male stud portion.

Referring to Figure 1, the pallet comprises five spaced parallel bearers 10 across which are secured, at right angles, five stretchers 12, only three of the stretchers being shown in Figure 1, for clarity. The bearers and stretchers may conveniently be moulded from plastics material, such as polypropylene, and may be formed for example by injection-moulding. The bearers 10 are preferably at least partly hollow. Since the stretchers 12 are of constant cross-sectional shape they may also be formed by extrusion. The upper surface of each bearer 10 is formed with five transverse recesses 14 separated by lands 15. The bottom of each recess 14, as best seen in Figures 1A and 4, is formed

with two rectangular slots 16 on either side of an upstanding rib 17.

Each stretcher 12 comprises two rectangular box section ribs 18 separated by a hollow web portion 20 so disposed as to provide an upwardly facing groove 22 and a downwardly facing groove 24 in the stretcher.

5 As best seen in Figure 4, the box section ribs 18 of the stretcher 12 are snugly received in the grooves 16 in each bearer 10 and the rib 17 on each bearer is received in the downwardly facing groove 24 in the stretcher.

10 The upper edge of each recess 14 in the bearers is chamfered, as indicated at 26, to receive a triangular hollow flange 28 on the stretcher. The overall thickness of each stretcher 12 is the same as the overall depth of each recess 14 so that the upper surface 30 of each stretcher is flush with the upper surfaces of the lands 15 between the stretchers.

15 The stretchers 12 are secured to the bearers 10 by two or more screws 32 (only one of which is shown in Figure 1A) which pass through holes in the web portions 20 of the stretchers and engage threaded holes in the bearers 10. For example, the screws may engage internally threaded sleeves which are embedded in the plastics material of the bearers. Alternatively, the stretchers 12 may be secured to the bearers 10 by nuts and bolts, locking pins, clamps, rivets or any other suitable type of fastening device. As a further example, snap fasteners 46/48 of the kind shown in Figures 1A, 6 and 7 may
20 be employed, with each fastener comprising a male fastening stud portion 46 and a female receiving hole portion 48. The male portions 46 are integrally moulded on bottom surfaces of the rectangular slots 16 at the time of manufacture of the bearers 10, and the

female portions 48 are formed as through-holes in hollow portions of the stretchers 12, or bottomed ribbed recesses (not shown in Fig. 1A) in solid portions of the stretchers 12, subsequent to extrusion or at the time of moulding of the stretchers 12. The female portions 48 are formed at positions along bottom surfaces of the ribs 18 corresponding to the respective male portions 46. This fastening method advantageously allows all fastenings to be repeatedly reused, thus lowering usage costs.

In the arrangement of Figures 1-4, three further recesses 34 are provided in the underside of each bearer 10 and are provided with grooves and ribs, corresponding to the grooves and ribs 16, 17, to receive two or three further stretchers extending across the undersides of the bearers 10, so that the pallet is double-sided. The undersides of the bearers 10 are formed with further plain recesses 36, between the recesses 34, for the purpose of reducing the weight of the bearers and saving in plastics material. For the same reason the sides of the bearers 10 are formed with recesses 38 (see Figures 1 and 2) between the stretchers 12. The greater width of the bearers between the recesses 38 also reduces the unsupported length of the stretchers between adjacent bearers, thus reducing deflection of the stretchers or allowing for wider spacing of the bearers.

As seen from the end view in Figure 3, each bearer 10 also reduces in width towards its undersurface, as indicated at 40 in Figure 3.

Figure 5 shows a modified form of bearer where the two plain recesses 36 on the underside of the bearer are replaced by recesses formed with grooves 42 and a rib 44 to receive another stretcher, so that the double-sided pallet may have up to five stretchers on the underside as well as on the upper side.

The inter-engagement of the ribs and groove on each stretcher within the grooves and rib on the bearer locks each stretcher rigidly to each bearer at right angles thus eliminating twisting distortion of the pallet, or the "parallelogram effect", as previously mentioned. Since the regions of the bearers between the stretchers are of the same height as the stretchers, additional support is provided by the bearers for goods stored on the pallet and, as previously mentioned, this reduces any tendency for sheet or similar materials to bow downwardly between the stretchers.

The rib and groove arrangement also locates the stretchers accurately with respect to the bearers as the screws or other fastening devices are fitted, thus simplifying and reducing the cost of assembly.

Since the stretchers and bearers are separately formed, they may be formed from different materials if required, the particular materials being chosen to optimise strength in relation to cost.

Further, to aid stability and increase safety, an anti-slip surface, being a suitably adhesive material, may be completely or selectively applied to upper and/or lower surfaces of the bearers 10 and/or stretchers 12. In order to improve bonding between contacting surfaces of the anti-slip surface and the bearers 10 and/or stretchers 12, and to reduce manufacturing costs, the anti-slip surface may be co-moulded and/or co-extruded concurrently with the manufacture of the bearers 10 and/or stretchers 12. Alternatively, the bearers 10 and/or stretchers 12, may be dip-coated with a suitable adhesive material to provide the anti-slip surface.

If the fastening devices are of a type which can be undone or easily cut or

ruptured, the pallet may be disassembled, if required, for storage or transport. Costs of transport and storage may thus be reduced. Also, the knock-down construction of the pallet enables damaged pallets to be repaired by replacing only the damaged parts, and allowing the damaged parts to be recycled if of appropriate material.

5 The pallet according to the invention can be made to any length or width. The stretchers 12 may be manufactured in standard lengths for the commonest sizes of pallet but may then be cut down if required to make pallets of intermediate length. Alternatively, the stretchers 12 may be cut from longer extruded lengths of material, this again allowing pallets of any length to be manufactured.

10 The above described form of pallet is by way of example only, and it will be appreciated that modifications may be made to the design without departing from the scope of the invention. For example, other types of inter-engaging formations may be provided on the stretchers and bearers instead of the rib and groove arrangement described. In the arrangement shown the lands 15 between the stretchers are integral
15 with the bearers, but in an alternative arrangement the lands may comprise separately formed elements which are subsequently attached to the bearers. The bearers 10 may be differently shaped and dimensioned according to the materials from which they are made, and the recessing of the bearers to save material and weight may not be necessary with materials where these factors are not critical. Although the bearers are preferably
20 hollow when formed from plastics, the invention does not exclude the possibility of the bearers being solid.

CLAIMS

1. A pallet comprising a number of spaced elongate parallel bearers across which are secured a number of spaced elongate parallel stretchers disposed generally at right angles to said bearers, at least one of said bearers and at least one of said stretchers
5 having inter-engaging formations serving to maintain said bearer and stretcher substantially at right angles to one another.
2. A pallet according to Claim 1, wherein said inter-engaging formations are disengageable when required, releasable securing means being provided to secure said bearer and stretcher together and to hold the formations in engagement with one
10 another.
3. A pallet according to Claim 2, wherein said securing means comprises a readily detachable fastening device, such as one or more screws, bolts, locking pins or clamps.
4. A pallet according to Claim 2, wherein said securing means comprises a
15 rupturable or cuttable fastening device, such as a rivet
5. A pallet according to Claim 2, wherein said securing means comprises a snap fastening device comprising a male stud projection formed on one part which securely detachably engages a female opening formed on an opposing part.
6. A pallet according to any of Claims 3 to 5, wherein at least two of said
20 fastening devices are provided at spaced locations to secure said stretcher to said bearer.
7. A pallet according to any preceding claim, wherein said inter-engaging formations comprise at least one projection formed on a portion of either said bearer or

stretcher which engages within at least one opening formed on a corresponding portion of a corresponding opposing bearer or stretcher.

8. A pallet according to Claim 7, wherein said formations comprise inter-engaging ribs and grooves.

5 9. A pallet according to Claim 8, wherein said ribs and grooves extend longitudinally with respect to said stretchers and transversely with respect to said bearers, at least one of said bearers being formed with alternating ribs and grooves to engage respective alternating grooves and ribs formed on at least one of said stretchers.

10 10. A pallet according to Claim 9, wherein said stretcher is of constant cross-sectional shape.

11. A pallet according to any preceding claim, wherein at least one of said bearers is provided with a support surface between two adjacent stretchers lying in substantially the same plane as a support surface on said stretchers.

15 12. A pallet according to Claim 11, wherein said bearer support surface is formed on an integral part of said bearer.

13. A pallet according to Claim 11, wherein said bearer support surface is formed on a separate element secured to said bearer.

14. A pallet according to any of Claims 11 to 13, wherein said bearer support surface extends the whole length between said adjacent stretchers.

20 15. A pallet according to any of Claims 11 to 14, wherein said bearer support surface extends the full width of said bearer.

16. A pallet according to any preceding claim, wherein said stretchers are

secured across only upper sides of said bearers to provide a single-sided pallet.

17. A pallet according to Claim 16, wherein said spaced parallel stretchers are secured across undersides of said bearers to provide a double-sided pallet.

18. A pallet according to Claim 17, wherein said underside stretchers are secured to and inter-engaged with said bearers in a similar manner to the manner in which said upper side stretchers are secured to and inter-engaged with said bearers.

19. A pallet according to any preceding claim, wherein the width of said bearer varies.

20. A pallet according to any preceding claim, wherein said bearers and/or said stretchers are at least partly hollow.

21. A pallet according to any preceding claim, wherein said stretchers and bearers are formed from the same material.

22. A pallet according to any preceding claim, wherein upper and/or lower surfaces of said bearers and/or stretchers are at least partly formed with an anti-slip surface.

23. A pallet according to any preceding claim, wherein said bearers, said stretchers and said anti-slip surface are injection moulded.

24. A pallet according to any of Claims 1 to 22, wherein said stretchers and said anti-slip surface are extruded.

25. A pallet according to Claim 23 or Claim 24, wherein said anti-slip surface is co-moulded and/or co-extruded concurrently with said moulding and/or extrusion of said bearers and/or stretchers.

26. A pallet according to any of Claims 22 to 24, wherein said anti-slip surface may be formed subsequent to said moulding and/or extrusion of said bearers and/or stretchers by dip-coating.



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Claims searched: 1-26

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B8H (HLC, HQC, HQG, HQJ, HRB, HRX, HXX)

Int Cl (Ed.6): B65D 19/00, 19/26, 19/32.

Other: ONLINE : EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2335409 A GRIFFITHS	1,2,7,11-15,21-26
X	GB 2265137 A CONCEPT RESEARCH	1-3,6,7,11,12,14,15,20-26
X	GB 2263464 A POINT PLASTICS	1-2,4,6,7, 11,12,14,15,20-26,
X	GB 1388759 SICOPAL	1,2,5-12,14,15,20-26
X	US 3878796 MORRISON	1,7-12,14-26

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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